

NOAA Climate Science and Services Monthly Climate Update



National Oceanic and
Atmospheric Administration

September 2021

Karin Gleason

Climatologist, NOAA National Centers for
Environmental Information

John Nielsen-Gammon

Director, Southern Regional Climate Center

Scott Handel

Meteorologist, NOAA Climate Prediction Center

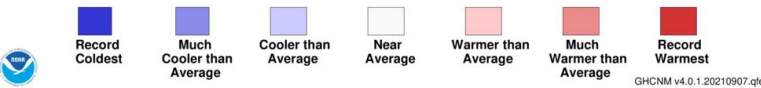
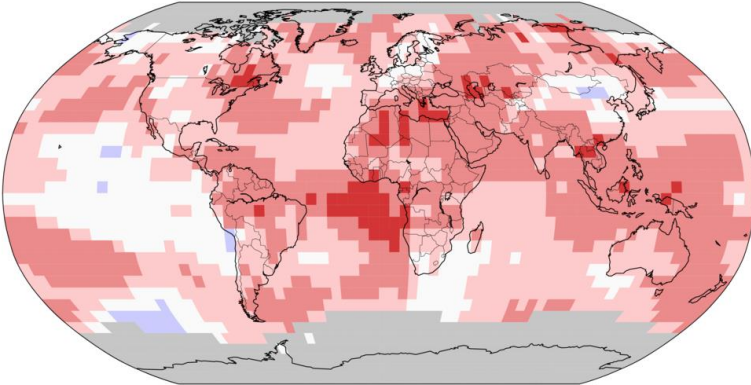
Global Temperature

The global temperature record dates back to 1880 (142 years)

Land & Ocean Temperature Percentiles Aug 2021

NOAA's National Centers for Environmental Information

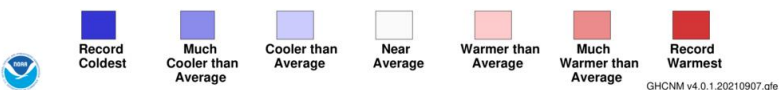
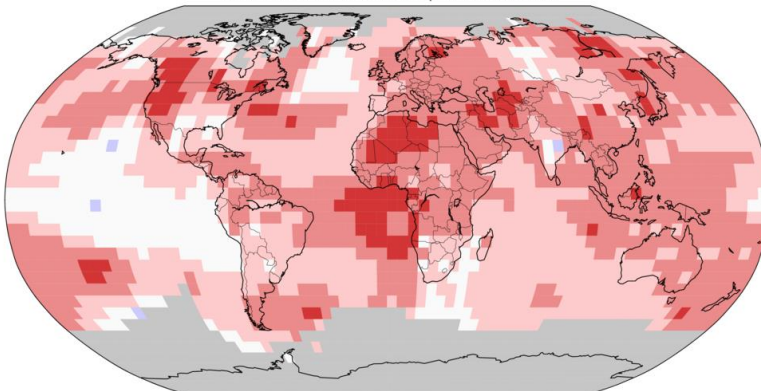
Data Source: NOAAGlobalTemp v5.0.0-20210908



Land & Ocean Temperature Percentiles Jun 2021–Aug 2021

NOAA's National Centers for Environmental Information

Data Source: NOAAGlobalTemp v5.0.0-20210908



August 2021

- **Global Land & Ocean:** +0.90°C / +1.62°F; 6th warmest
- **Global Land:** +1.34°C / +2.41°F; 2nd warmest
- **Global Ocean:** +0.74°C / +1.33°F; 6th warmest
(NH Land: +1.44°C / +2.59°F; warmest)

Season (Jun-Aug) 2021

- **Global Land & Ocean:** +0.90°C / +1.62°F; 4th warmest
- **Global Land:** +1.38°C / +2.48°F; warmest
- **Global Ocean:** +0.72°C / +1.30°F; 6th warmest



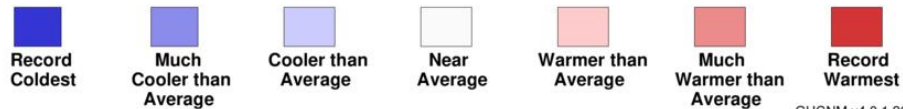
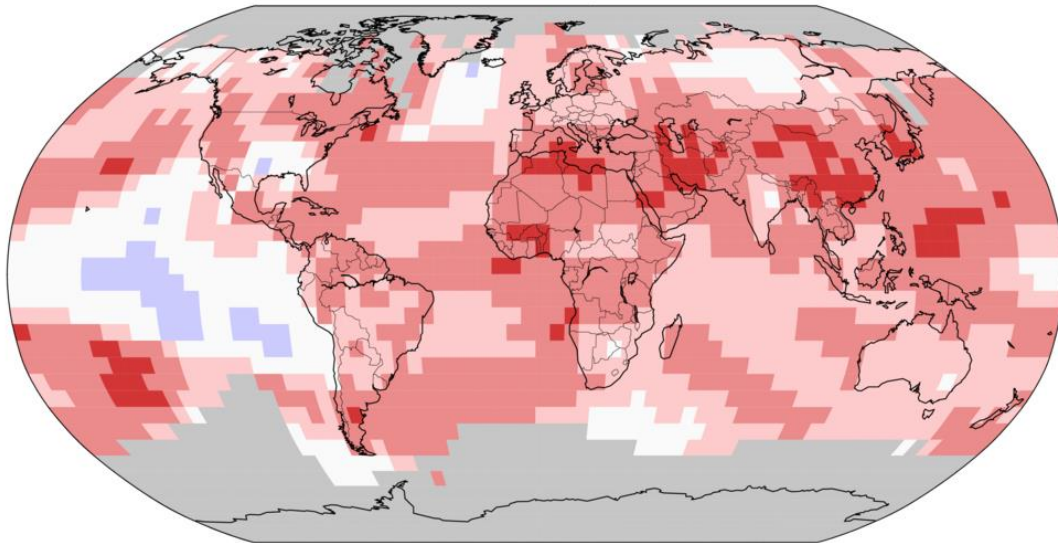
Global Temperature

The global temperature record dates back to 1880 (142 years)

Land & Ocean Temperature Percentiles Jan–Aug 2021

NOAA's National Centers for Environmental Information

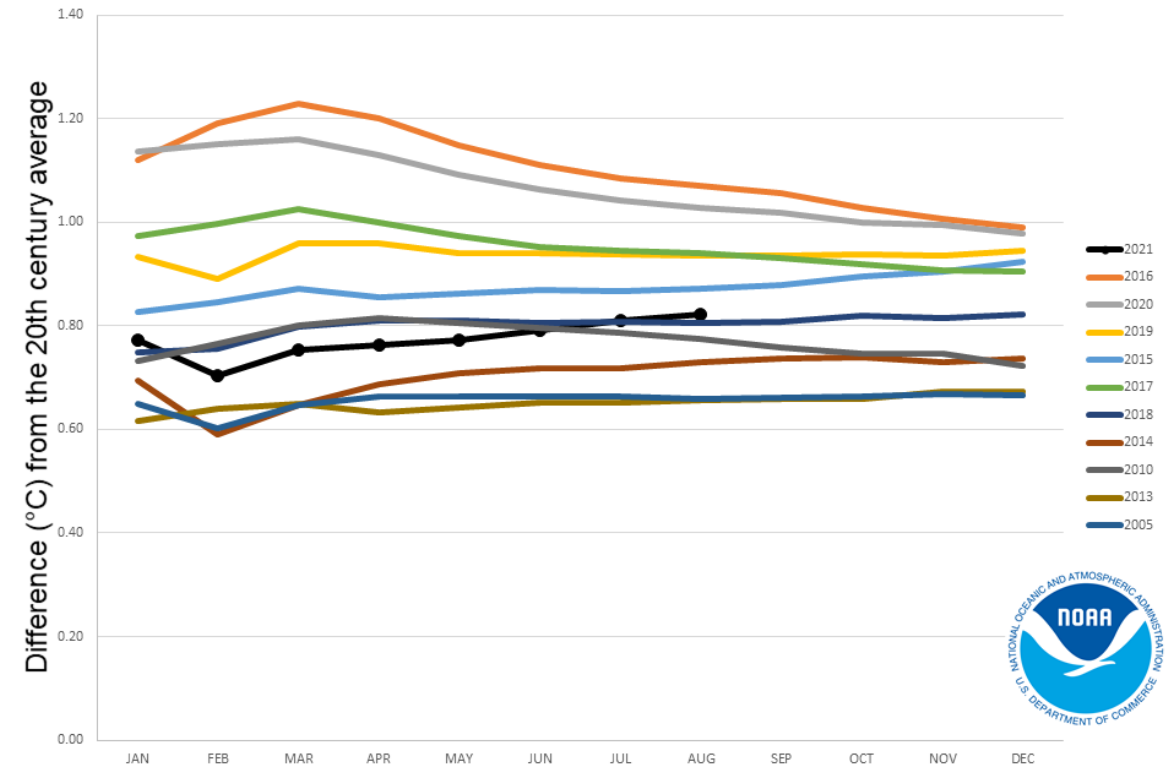
Data Source: NOAAGlobalTemp v5.0.0–20210908



GHCNM v4.0.1.20210907.q1e

Year-to-Date Global Temperatures

for 2021 and the ten warmest years on record



2021 Temperature Ranking Outlook

- <2% chance among 5 warmest years
- Virtually certain that 2021 will be a top 10 year
- Very likely to rank 6th or 7th warmest

January–August 2021

- Global Land & Ocean: +0.82°C /+1.48 °F; 6th warmest

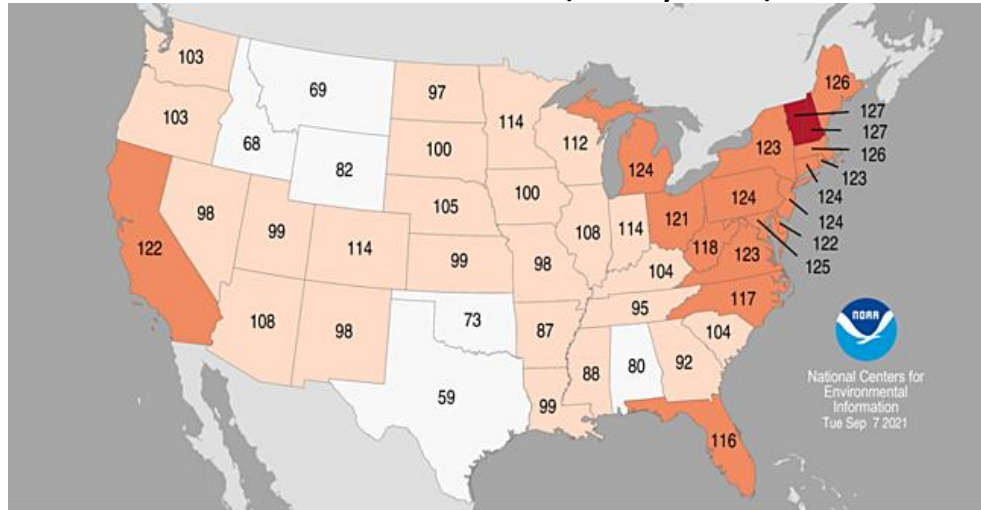
Contiguous U.S. August 2021

Temperature: 74.0°F, +1.9°F, 14th warmest August

Precipitation: 3.09", +0.47", 14th wettest August

Temperature Percentiles August 2021

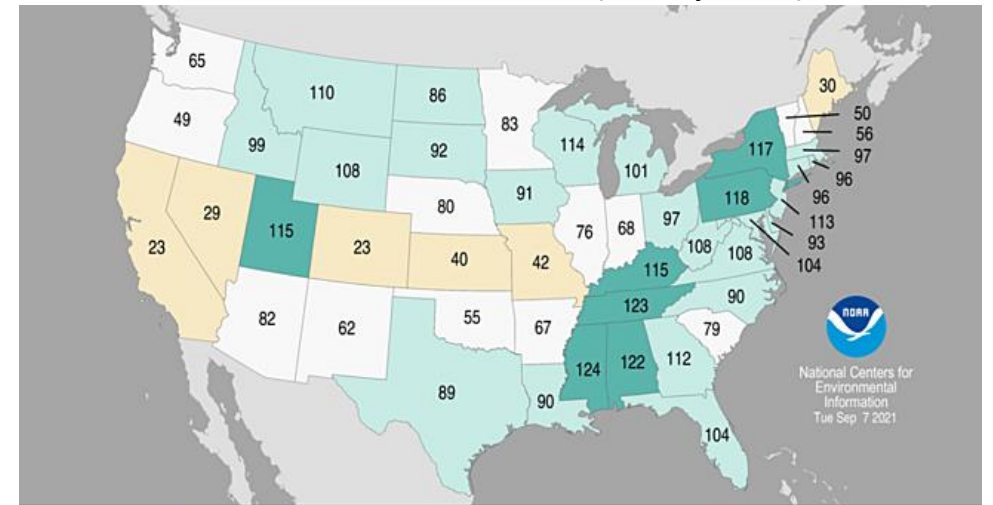
Period: 1895-2021 (127 years)



- Above-average temperatures across West Coast, SW, from Plains to East Coast
- VT and NH warmest August
- Near-to below-average temperatures observed in Rockies and n Plains

Precipitation Percentiles August 2021

Period: 1895-2021 (127 years)



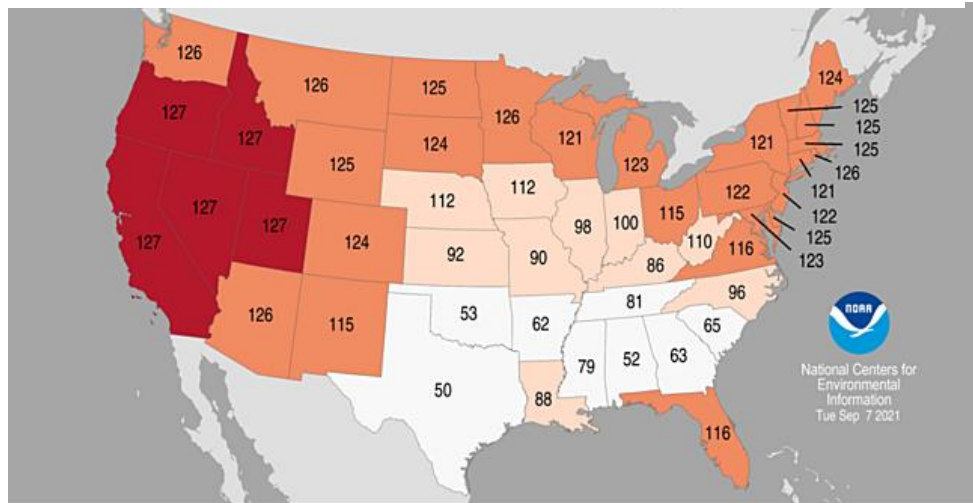
- Above-average precipitation across c and n Rockies, n Plains, Great Lakes, from Deep South to s New England
- MS – 4th wettest, TN 5th wettest
- Below-average precipitation across parts of West, s Rockies, c Plains, Midwest, n Great Lakes, n New England

Contiguous U.S. June-August 2021

Temperature: 74.0°F, +2.6°F, tied with 1936 for warmest summer on record

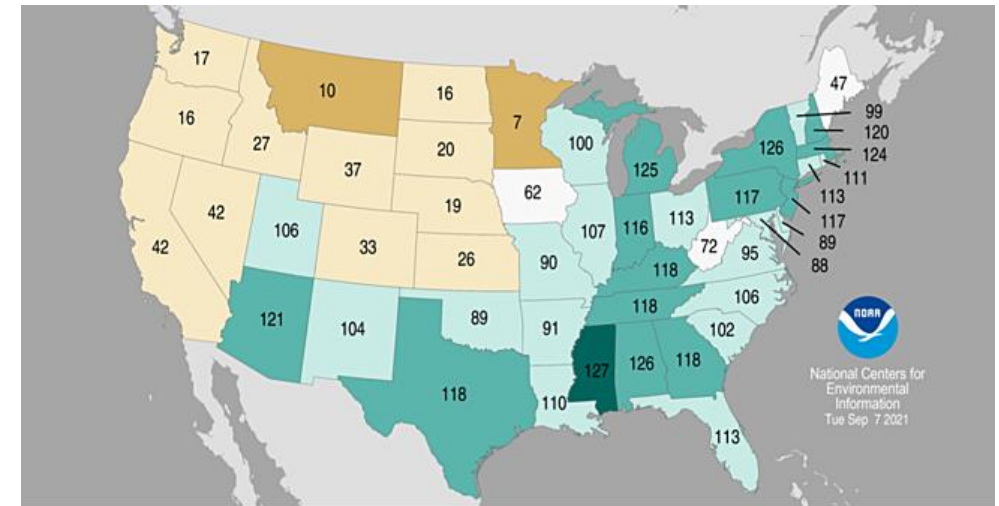
Precipitation: 9.48", +1.16", 8th wettest summer on record

Temperature Percentiles Jun-Aug 2021
Period: 1895–2021 (127 years)



- Above-average to record-warm temperatures from West Coast to Great Lakes and into the Northeast, Mid-Atlantic, Gulf Coast
- CA, NV, UT, OR, ID: warmest summer on record
- No state ranked below average for summer

Precipitation Percentiles Jun-Aug 2021
Period: 1895–2021 (127 years)



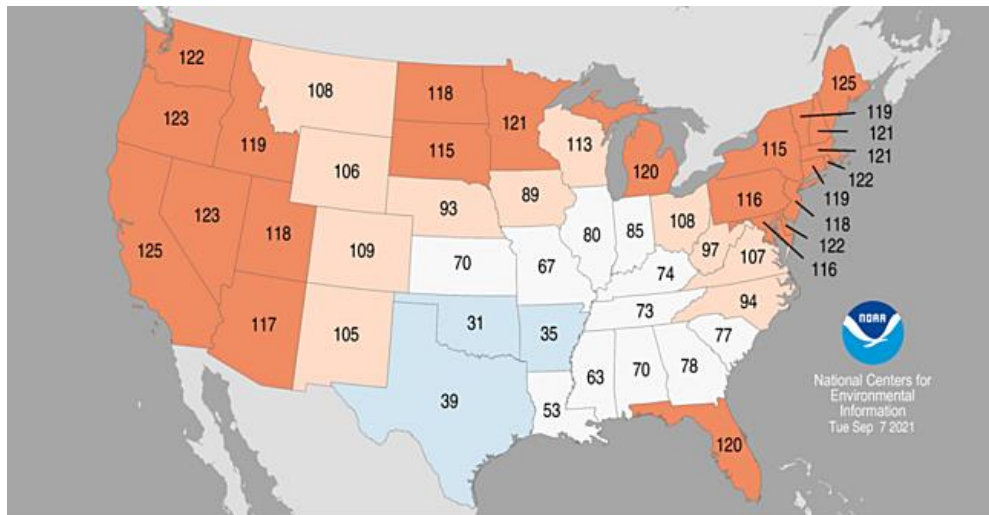
- Above-average precipitation across Great Basin & SW, from s Plains to Great Lakes, across much of eastern U.S.
- Below-average precipitation from Northwest to Great Lakes and into c Plains
- MS – wettest summer; MN – 7th driest summer on record

Contiguous U.S. January-August 2021

Temperature: 55.6°F, +1.8°F, 13th warmest

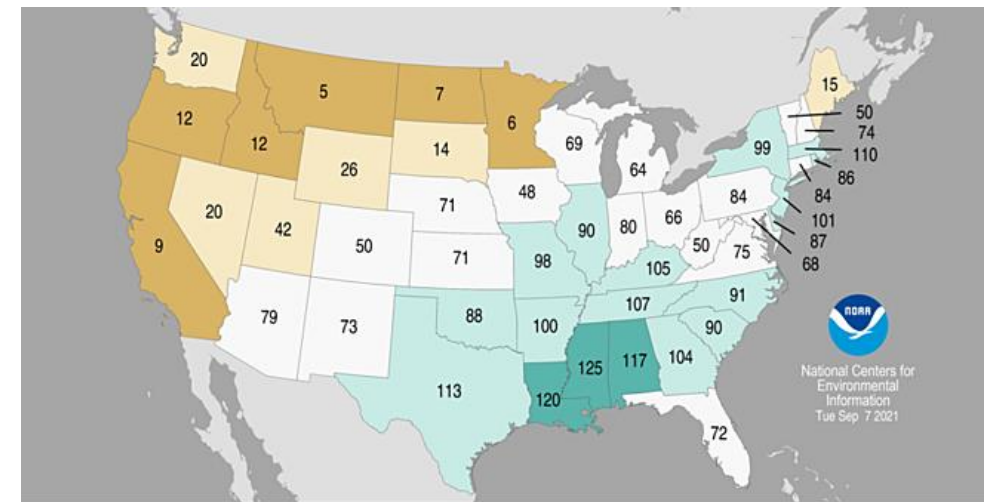
Precipitation: 21.19", +0.48", "Near Average"

Temperature Percentiles Jan-Aug 2021
Period: 1895–2021 (127 years)



- Above-average temperatures from West Coast to Great Lakes into the Northeast, parts of Mid-Atlantic and SE
- CA & ME 3rd warmest Jan–Aug on record
- Below-average temperatures across s Plains & lower MS Valley

Precipitation Percentiles Jan-Aug 2021
Period: 1895–2021 (127 years)



- Above-average precipitation from Deep South to Midwest, across SE, parts of NE
- Below-average precipitation from West Coast to w Great Lakes, across parts of New England
- MS – 3rd wettest; MT – 5th driest Jan–Aug on record



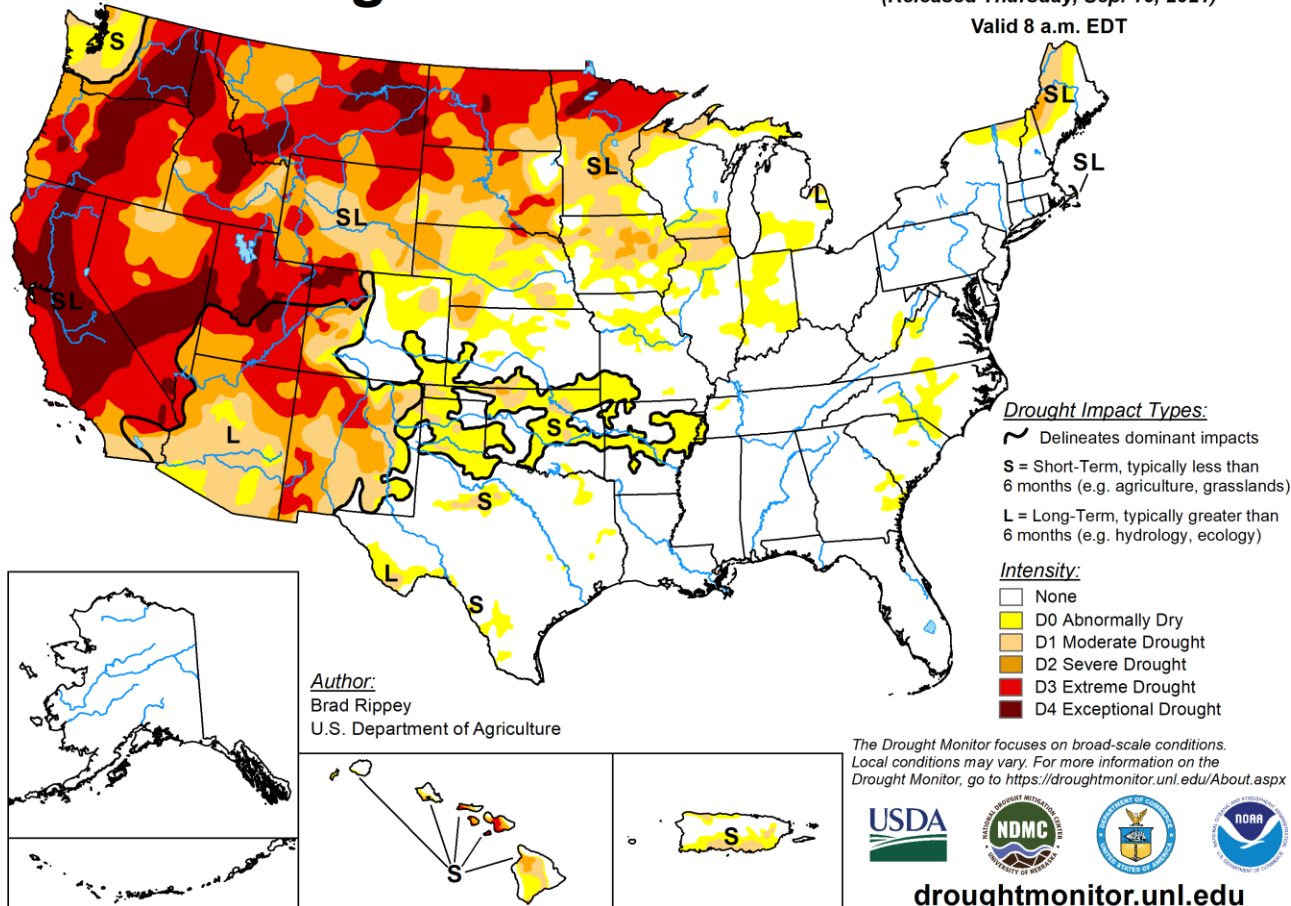
Current U.S. Drought

~45.6% of Contiguous U.S. in Drought

(↓ 1 percentage point since late Aug)

U.S. Drought Monitor

September 14, 2021
(Released Thursday, Sep. 16, 2021)
Valid 8 a.m. EDT



Drought Severity and/or Coverage Lessened

Parts of New England, N Plains, C Appalachians, SW, Great Basin, PNW

Degradation/Intensification

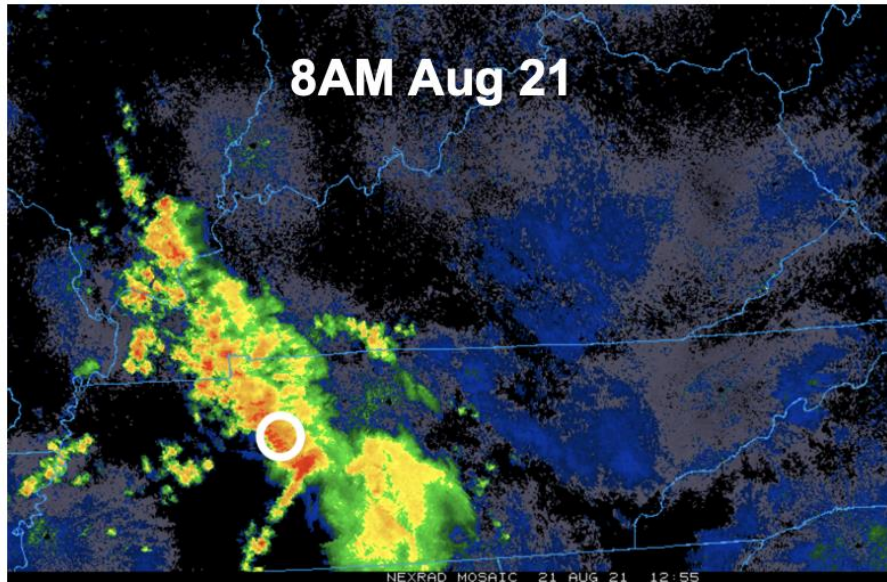
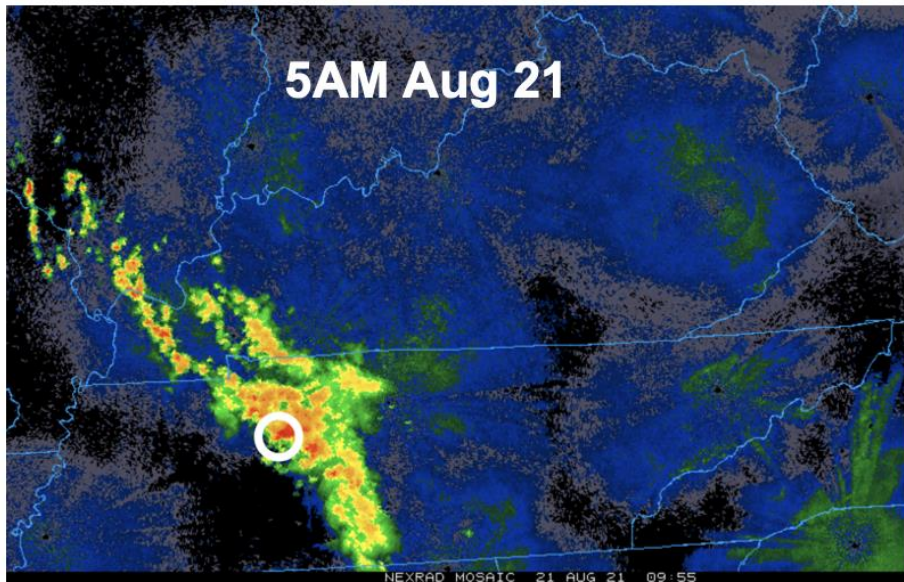
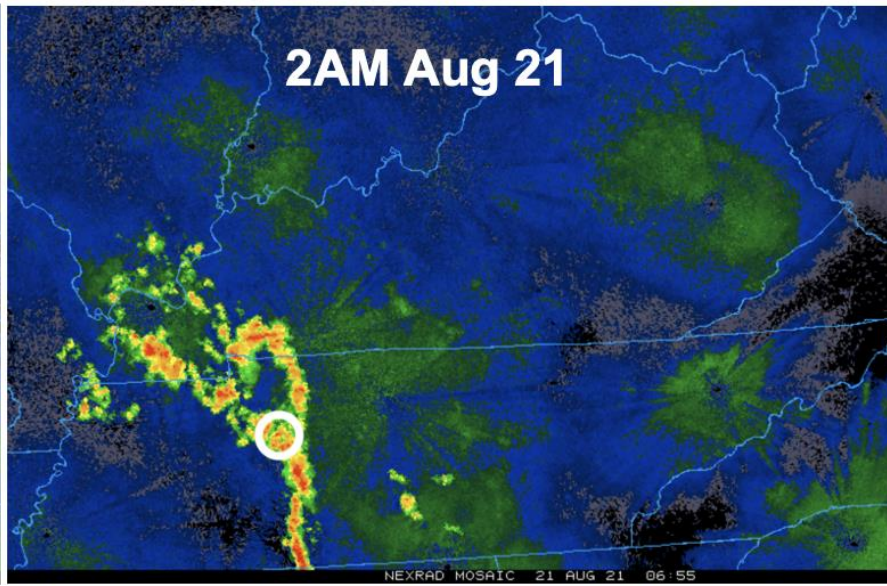
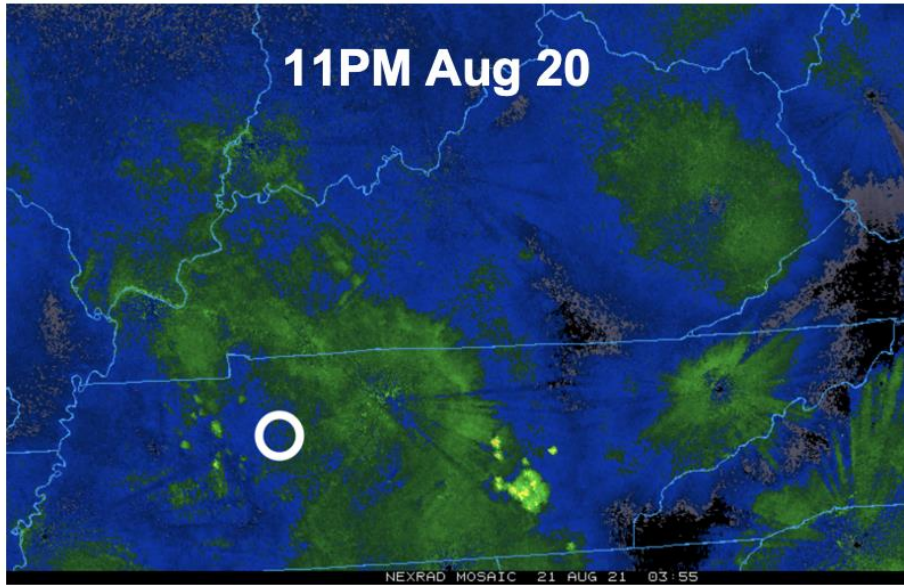
Parts of the N Rockies

Outside CONUS

Slight contraction in drought coverage across Hawaii. Puerto Rico drought expanded



Heavy Rainfall: Tennessee, August 21



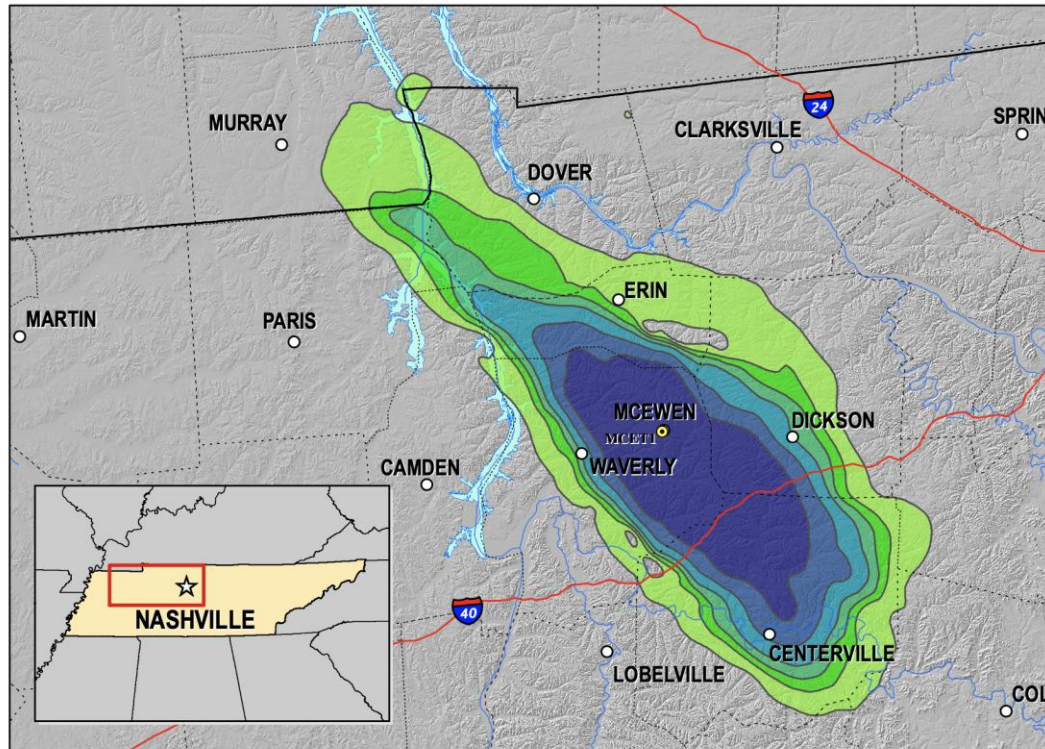
- Strong low-level flow from SW
- Very moist air moving into unstable environment
- Stationary frontal boundary
- Enough info to know: *flood risk present within region*
- Precise location and magnitude unknowable



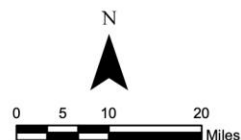
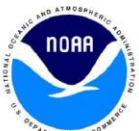
Heavy Rainfall: Tennessee, August 21



MCEWEN ID: MCET1 Latitude: 36.1069 Longitude: -87.6369



West Central Tennessee, 20-22 August 2021
Annual Exceedance Probabilities (AEPs) for the Highest 12-hour Rainfall Period

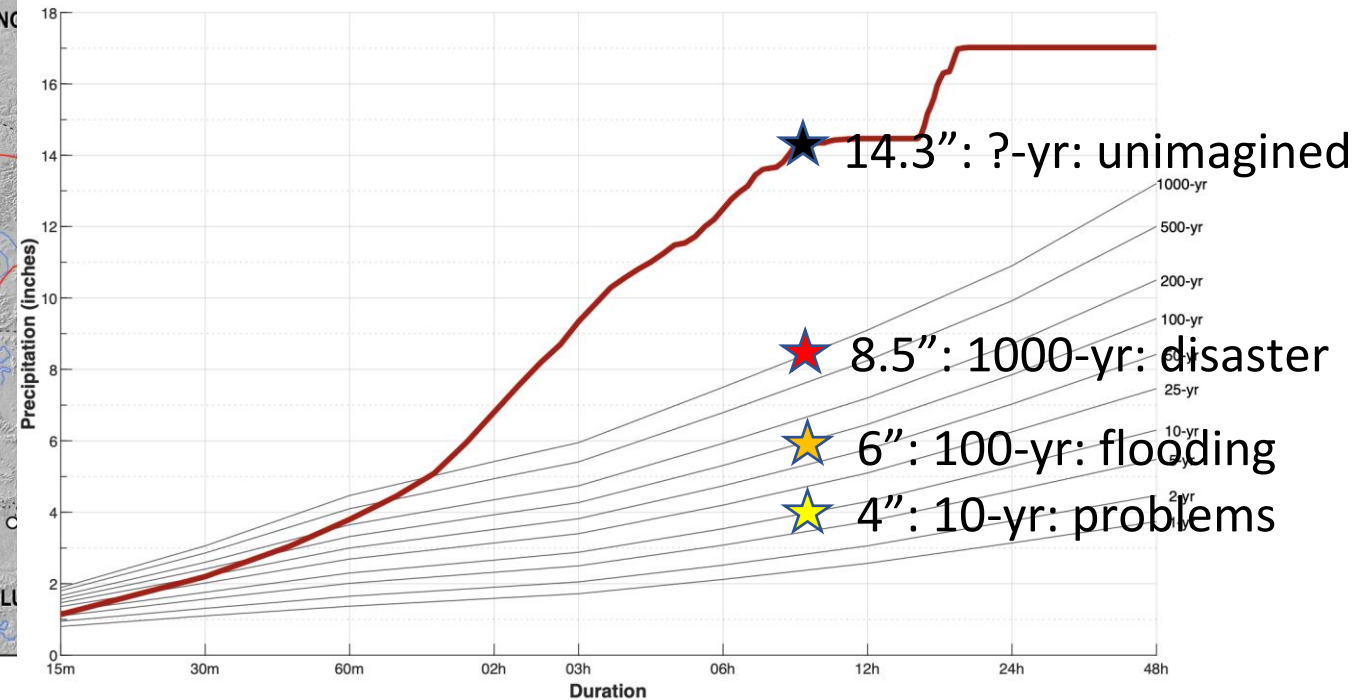


National Water Center
Office of Water Prediction, National Weather Service
National Oceanic and Atmospheric Administration

<https://www.weather.gov/owp/hdsc>

Created 23 August 2021
Precipitation frequency estimates are from NOAA Atlas 14.
Rainfall values come from 1-hour Stage IV multi-sensor data.

- > 1/10
- 1/50 - 1/10
- 1/100 - 1/50
- 1/200 - 1/100
- 1/500 - 1/200
- 1/1000 - 1/500
- < 1/1000

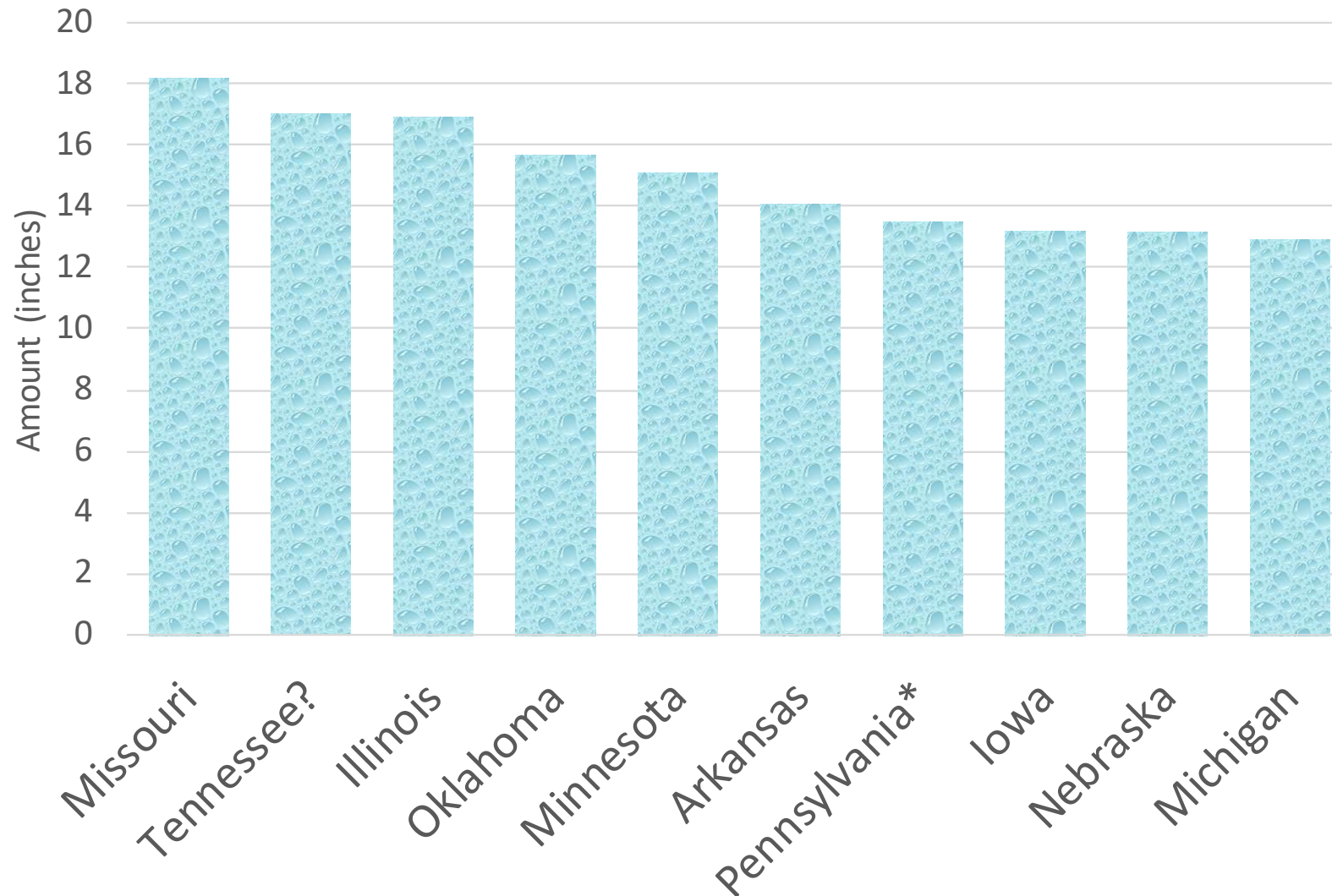


Map and background graph from NOAA's
Hydrometeorological Design Studies Center



Heavy Rainfall: Tennessee, August 21

Top Inland State 24 Hour Rainfall Records

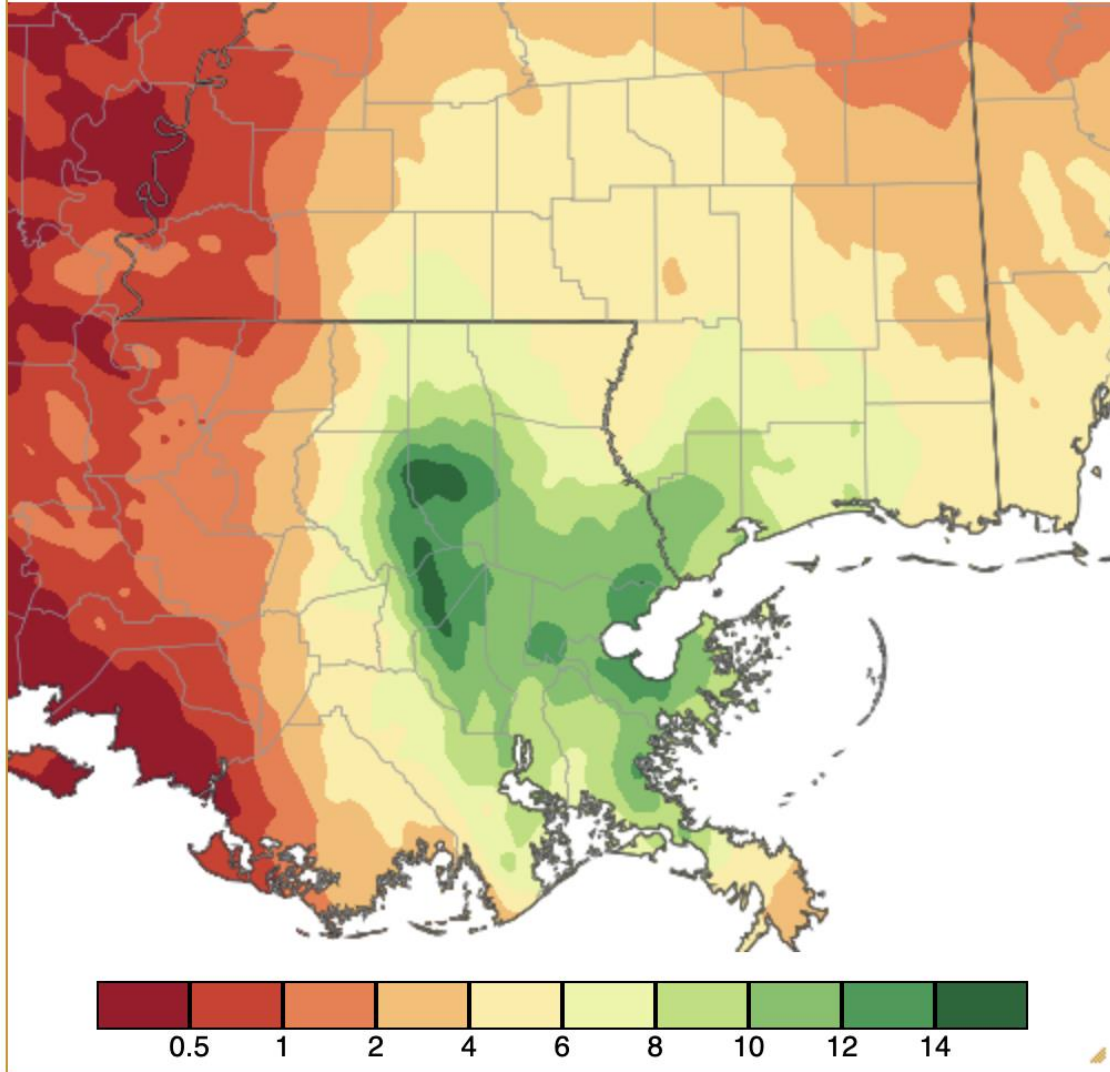


- State Climate Extremes Committee examining potential state record
- If it holds up, it would be the second-largest* official 24-hour rainfall record of any inland state in the US

**Third-largest, if you count Smethport PA July 1942*

Heavy Rainfall: Hurricane Ida, August 29-30

Total Precipitation - August 29, 2021 through August 30, 2021



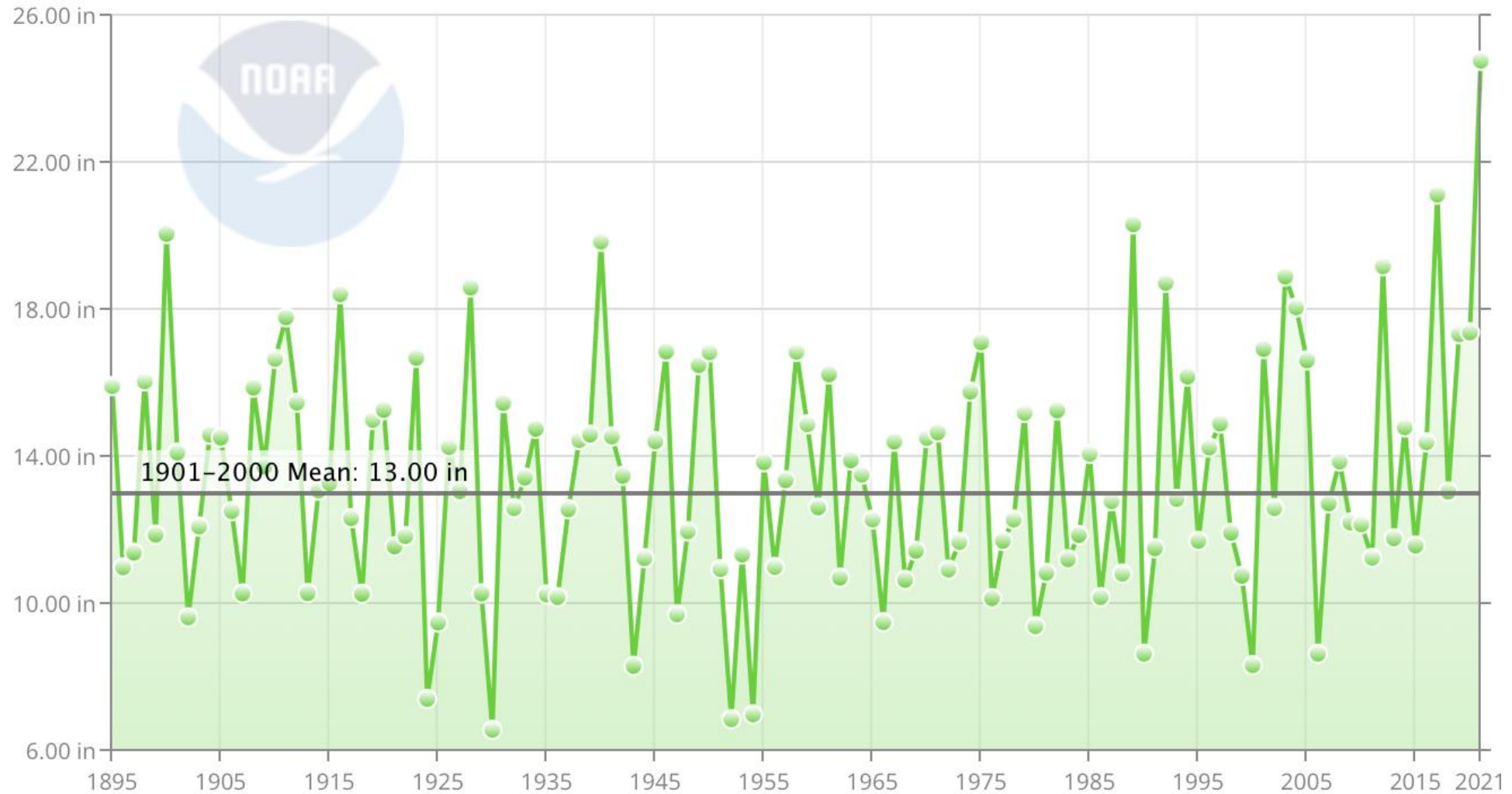


Heavy Rainfall: All Summer!

Mississippi Precipitation

June–August

- Mississippi Summer Wettest Ever: **24.78"**
- Alabama Second Wettest Ever **23.43"**



Heavy Rainfall: Trends

Physics

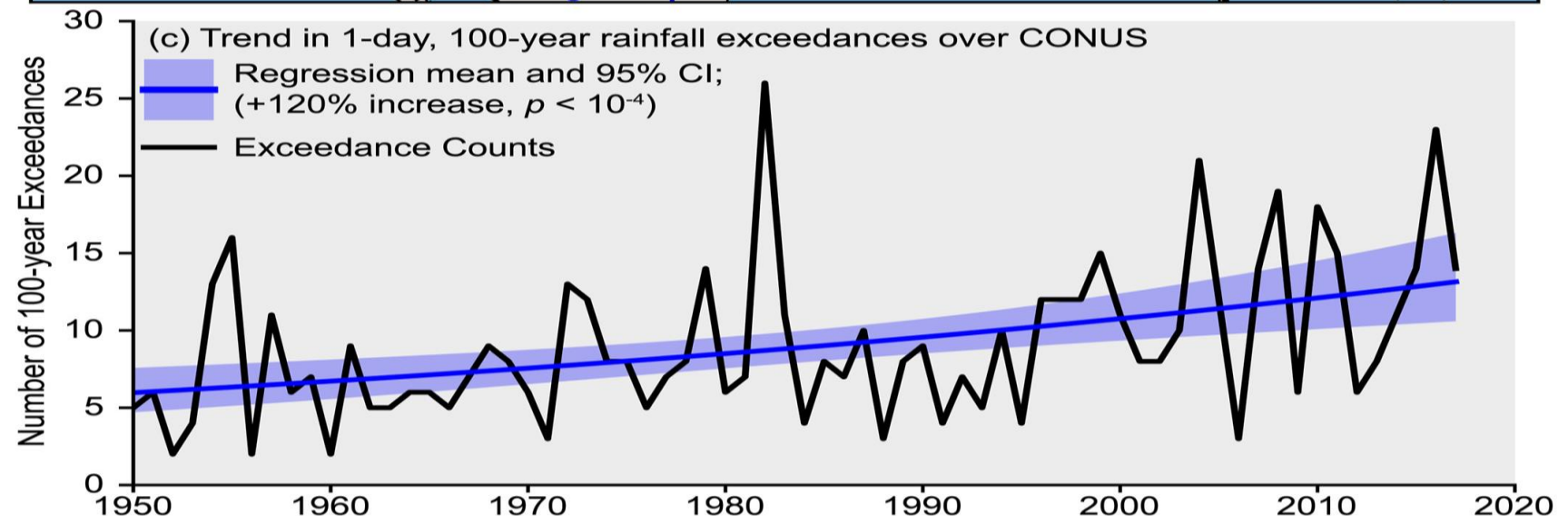
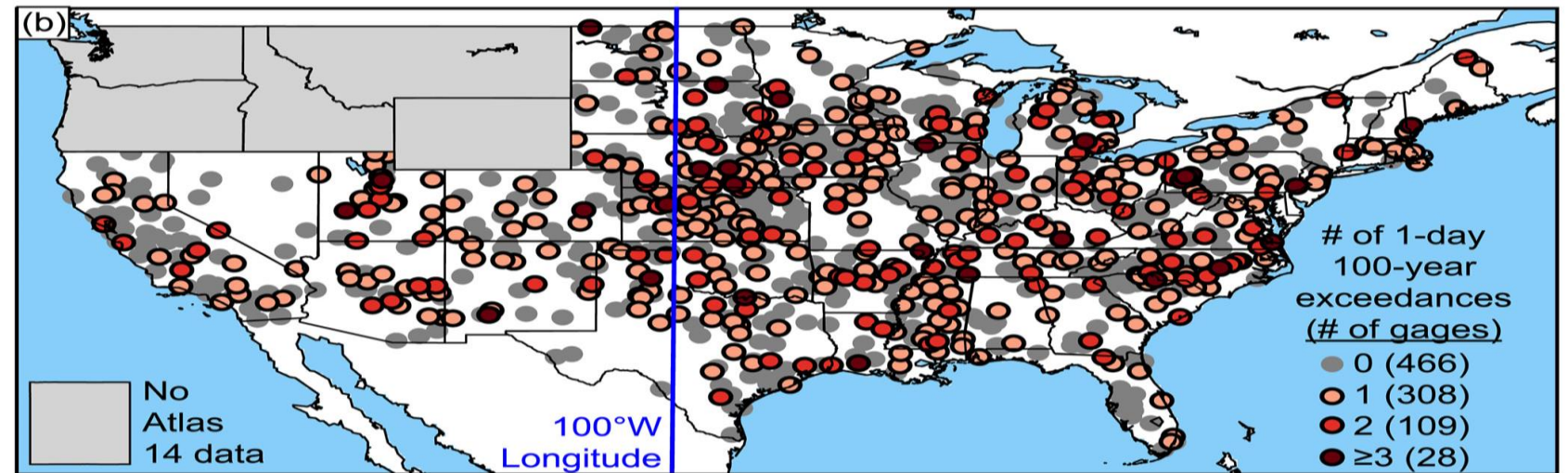
- Warmer air can contain more water vapor
- Storm structures, tracks can change too

Observations

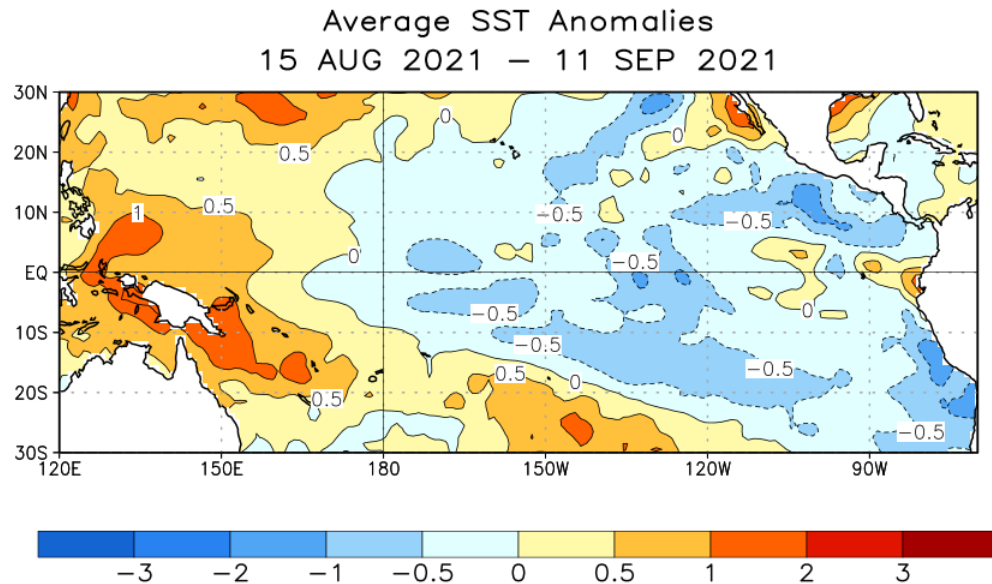
- Frequency and intensity of extreme US rainfall has increased
- Figure: Wright et al. 2019, 10.1029/2019GL083235

Models

- Robustly simulated historical and projected increases



Sea Surface Temperatures and ENSO

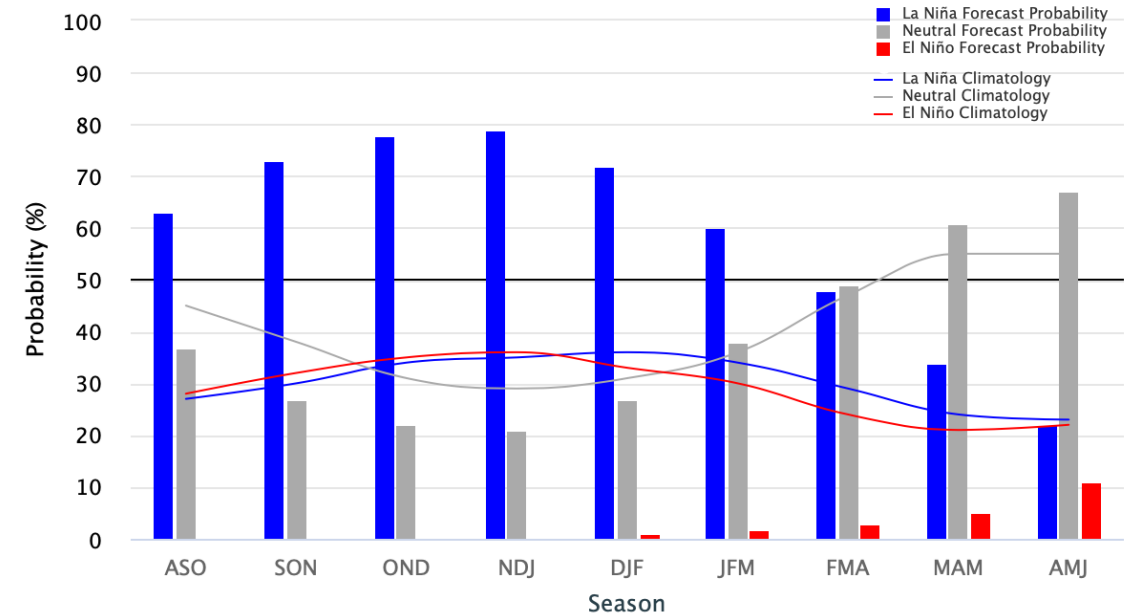


Sea surface temperatures

- Near to below normal sea surface temperatures continue across the central and eastern Pacific Ocean near the equator
- The oceanic and atmospheric observations currently reflect ENSO-Neutral conditions

Early-September 2021 CPC/IRI Official Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly
Neutral ENSO: -0.5°C to 0.5°C



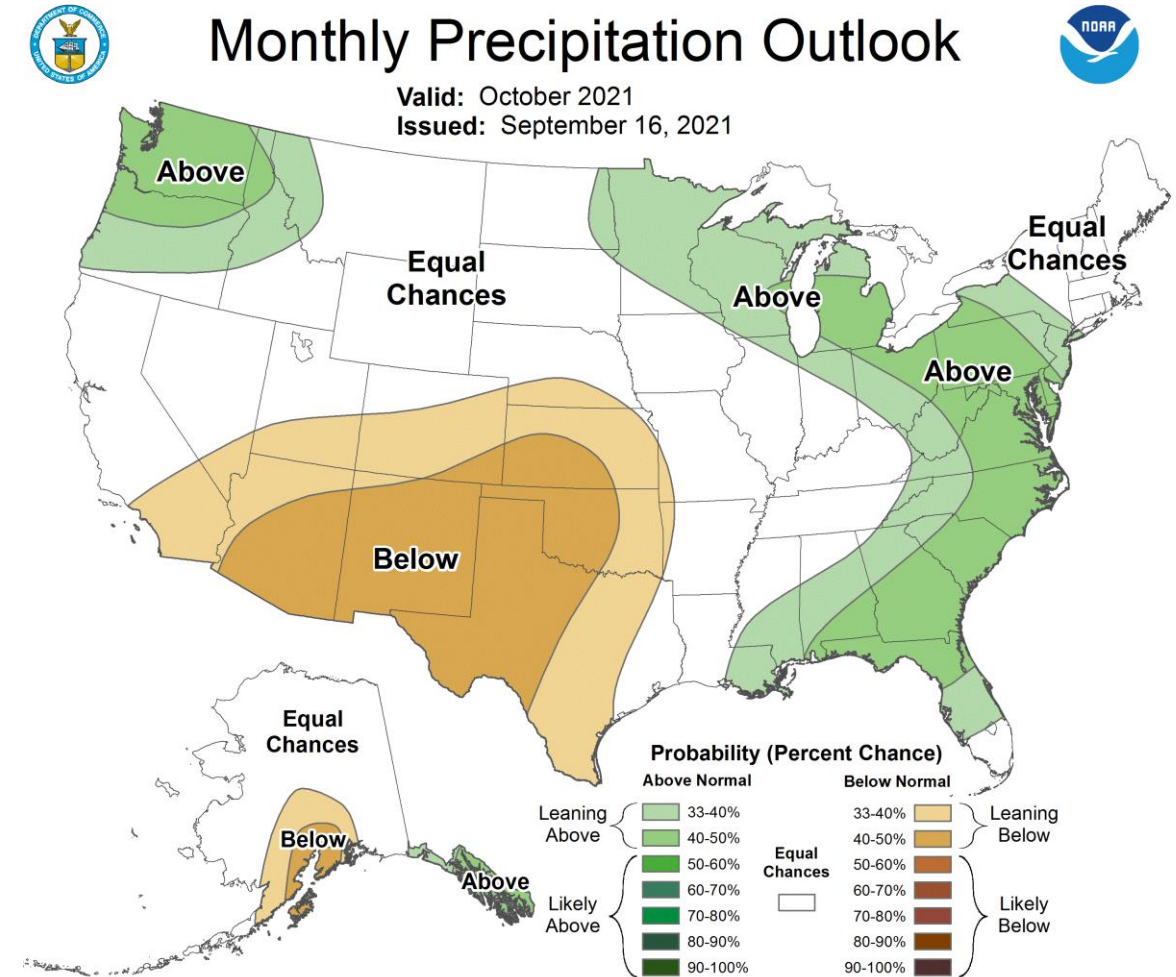
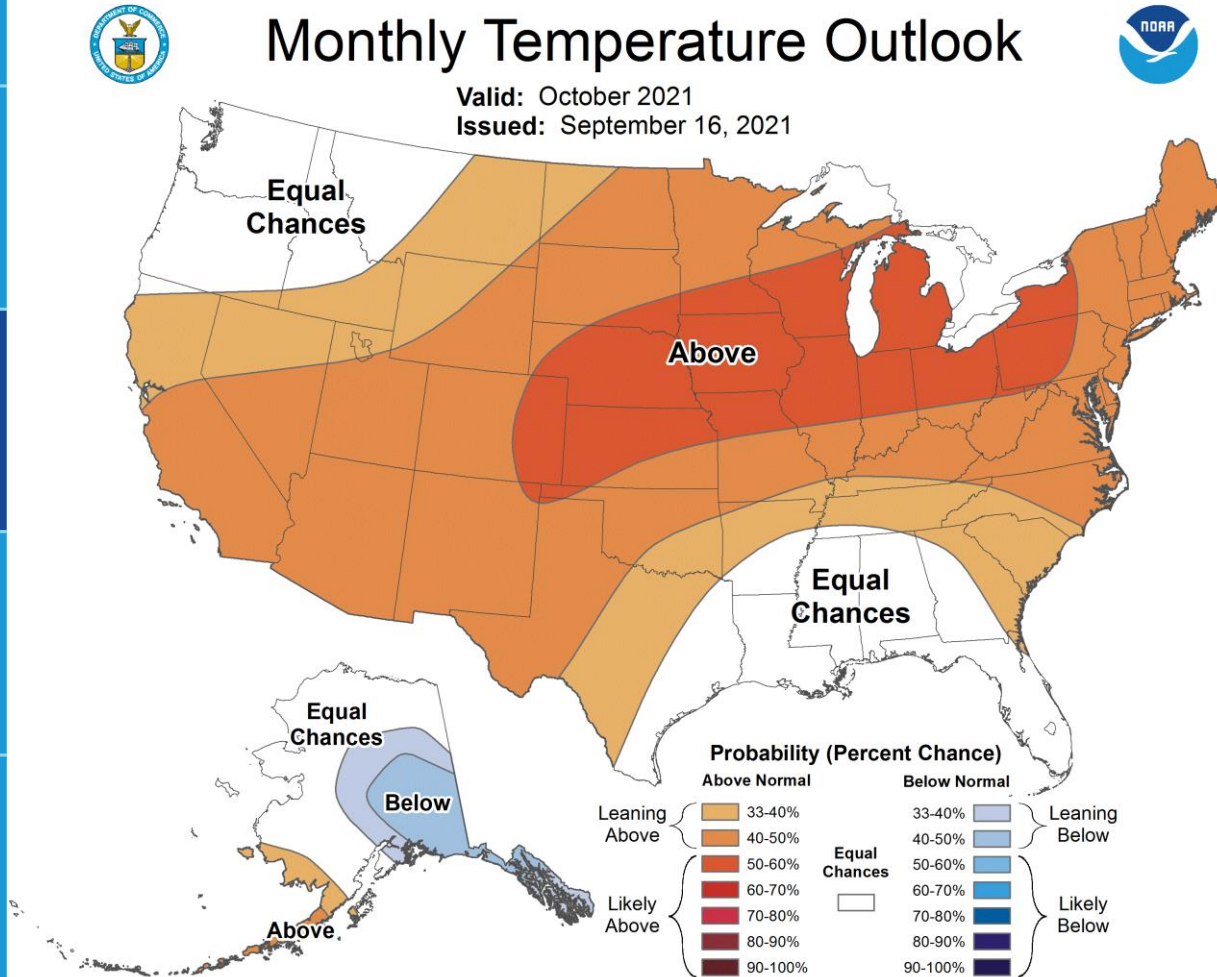
ENSO forecast

- La Niña is likely during this Winter (70-80 percent chance)
- Chances for ENSO neutral conditions increase next Spring

Monthly Forecast (October)

October Average Temperature Probability

October Total Precipitation Probability

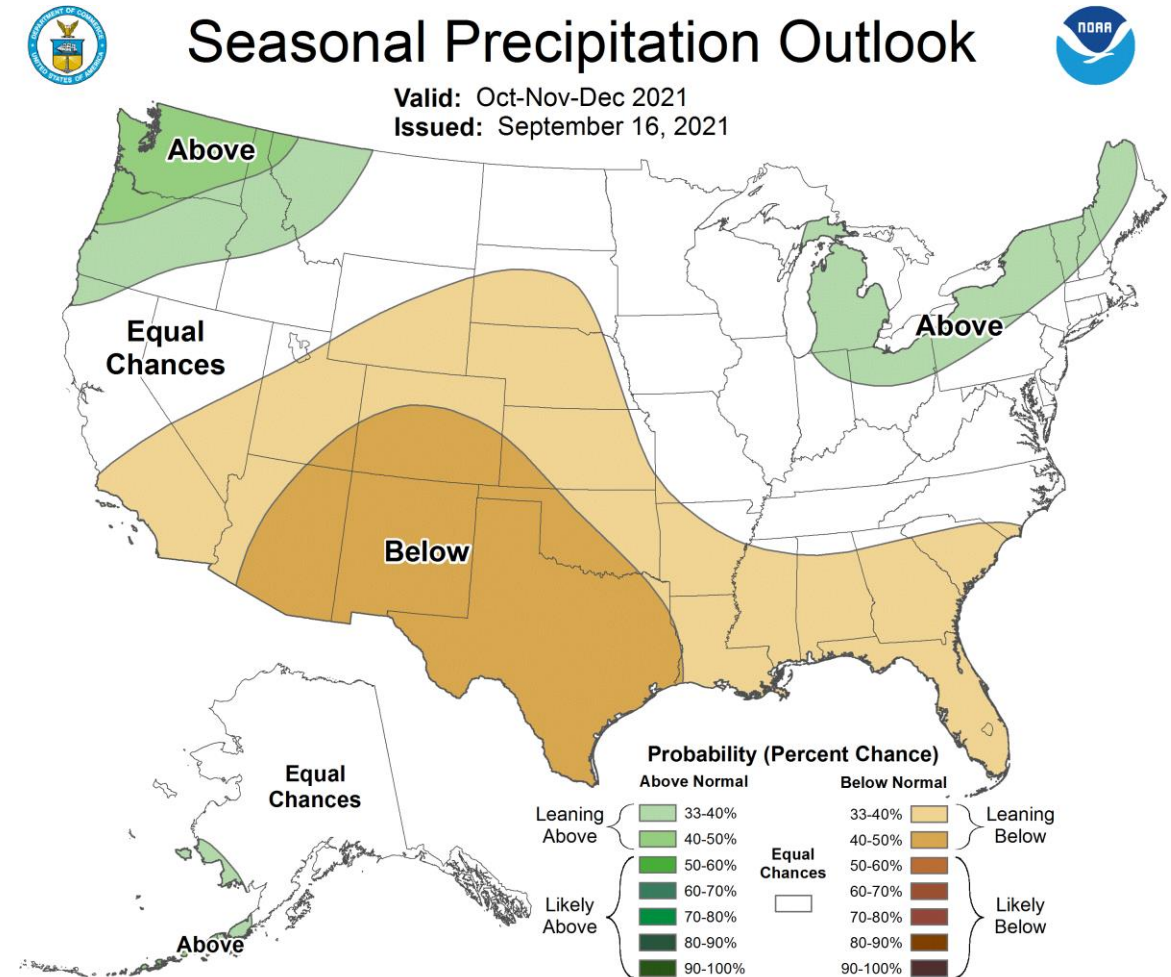
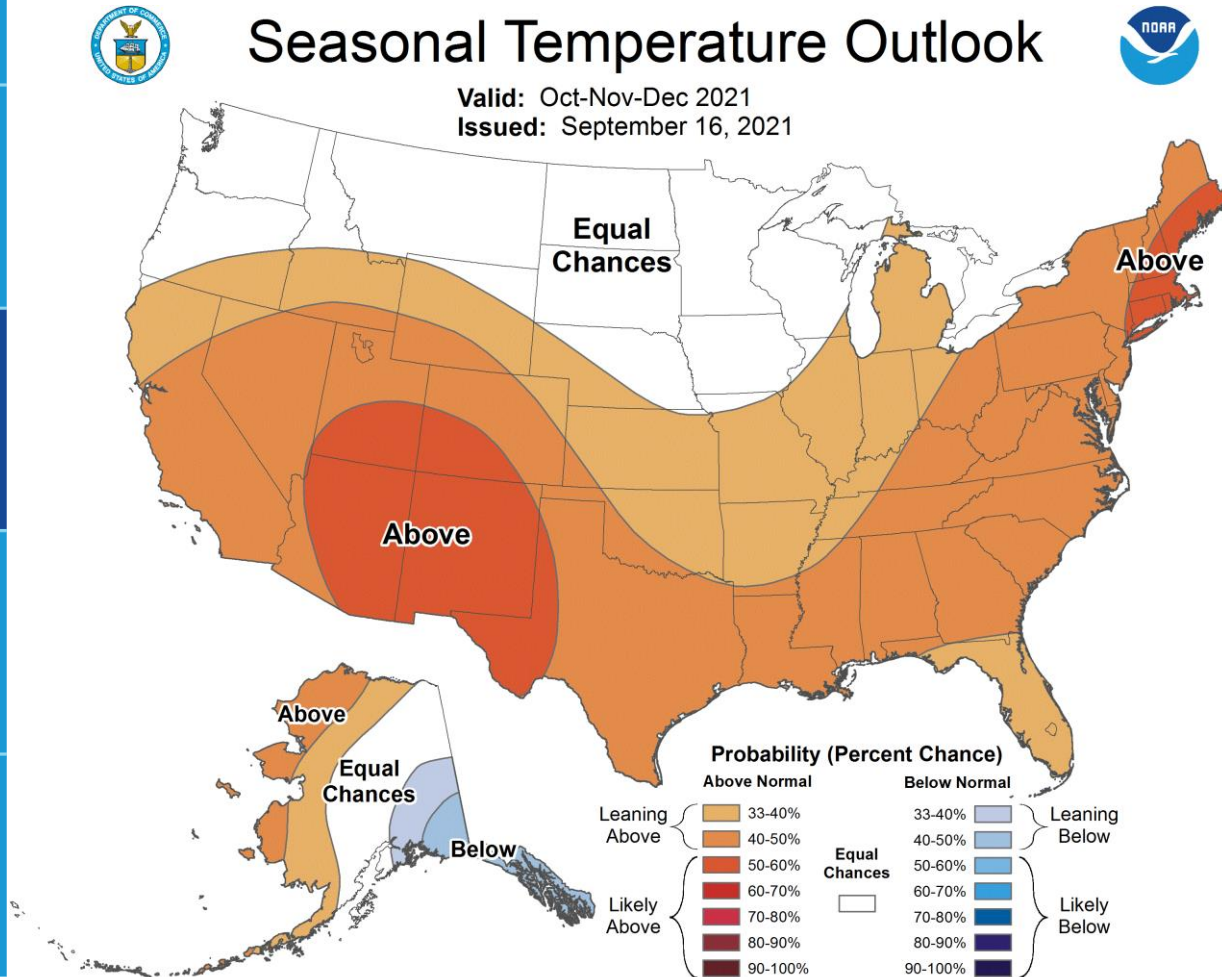




Three-month Forecast (Oct, Nov, Dec)

Oct-Nov-Dec Average Temperature Probability

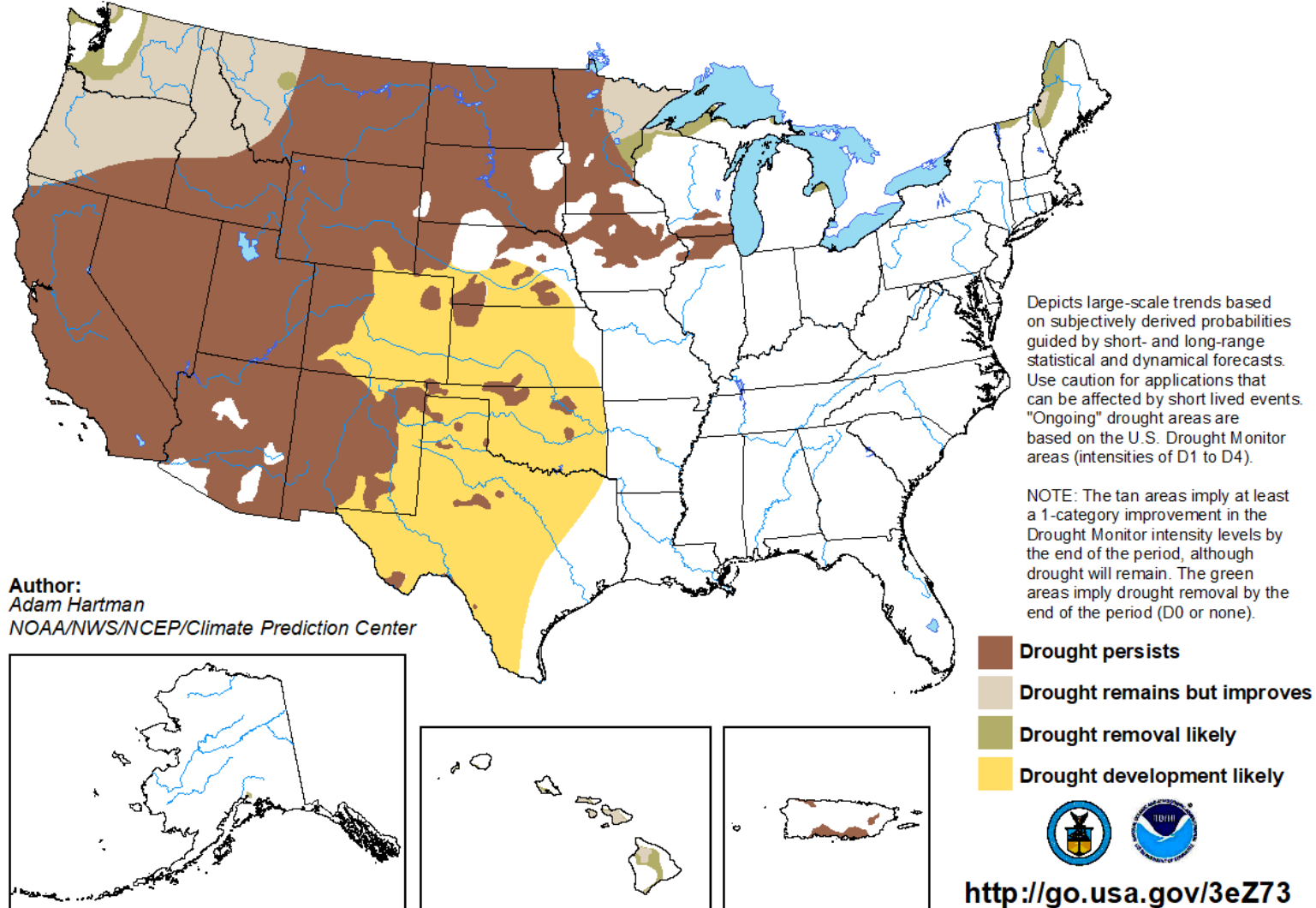
Oct-Nov-Dec Total Precipitation Probability



U.S. Drought Outlook

U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for September 16 - December 31, 2021
Released September 16



<http://go.usa.gov/3eZ73>



For More Information



TODAY'S PRESENTATION:

- <https://www.ncdc.noaa.gov/sotc/briefings>

NOAA's National Centers for Environmental Information: www.ncdc.noaa.gov

- Monthly climate reports (U.S. & Global): www.ncdc.noaa.gov/sotc/
- Dates for upcoming reports: <https://www.ncdc.noaa.gov/monitoring-references/dyk/monthly-releases>

NOAA's Climate Prediction Center: www.cpc.ncep.noaa.gov

Southern Regional Climate Center: <https://srcc.tamu.edu/>

U.S. Drought Monitor: www.drought.gov

Climate Portal: www.climate.gov

NOAA Media Contacts: john.jones-bateman@noaa.gov, 202-424-0929 (NOAA/NESDIS PAO)